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MEMORIAL TO THE LATE G. J. SYMONS, F.R.S.

ON May 31st a few friends of the late Mr. G. J. Symons assembled at the rooms of the Royal Meteorological Society, by invitation of the President, to consider the best means of commemorating the services to the nation of the late Founder of the Rainfall Organization.

It was resolved that the most appropriate memorial would be a gold medal, bearing on the obverse a portrait of Mr. Symons, to be awarded from time to time by the Council of the Royal Meteorological Society for distinguished work in connection with meteorology.

The following were nominated to form an executive committee to carry out the proposal:—

DR. THEODORE WILLIAMS.
MR. CAMPBELL BAYARD.
MR. RICHARD BENTLEY.
MR. C. HAWKSLEY.
MR. J. HOPKINSON.
PROF. MELDOLA.
DR. R. H. SCOTT.
MR. SOWERBY WALLIS.
MR. W. WHITAKER.

About a hundred and fifty guineas is already promised, and it is hoped that the fund will reach a sum of at least £750.

The committee will issue notices at an early date inviting contributions to the fund, and we venture to express the hope that our readers, and our colleagues of the rainfall organization, will respond heartily to do honour to the memory of our late chief.

METEOROLOGICAL EXTREMES.—III. WIND FORCE.

WE have received two communications respecting our article in last month's Magazine on the maximum force of the wind.

Mr. G. H. Courtenay, writing from Kenton, near Exeter, appears to be a little incredulous respecting the details we gave of the Kansas tornado of 1879; and he suggests that if these are correct the proper answer to the query with which we closed the article, "What is the strongest force the wind ever attains?" should be, "The force of gunpowder or dynamite!"

The details we gave were quoted from the account given in the Transactions of the St. Louis Academy of Science, *litera scripta manet.* On this point, however, we may now add that the library of the Royal Meteorological Society contains a series of photographs of various phenomena which resulted at different times from similar storms in America; and these comprise, amongst other remarkable effects, *straw* driven end on *into* the bark of trees; a plank similarly driven through the floor of a barn; and a horse killed by a branch of a tree driven into its side.

A photograph is, we know, not always unimpeachable as evidence; but in these instances there is no reason whatever that we are aware of for supposing that the photographer desired to test the credulity of the scientific world.

The other correspondent is Mr. G. von U. Searle, who says he has "a very clear recollection that in the great gale of Nov. 17–18, 1893, a velocity of 120 miles was recorded either at Fleetwood or Holyhead," according to a report which appeared in the *Times*, and he asks us to verify the accuracy of his recollection.

The highest velocity recorded in any 60 consecutive minutes during that gale was 89 miles at Holyhead, and 86 miles at Fleetwood. But these velocities are based on the erroneous factor (3), and to compare them with the velocities we quoted in our article, they must first be reduced by about four-fifteenths, which will give us 65 miles for Holyhead and 63 miles for Fleetwood.

There is no doubt at all that much higher rates of velocity were attained in short squalls and gusts; but, unfortunately, the cup anemometer is not a satisfactory instrument for giving us exact information on this point, and at the date of the gale in question the pressure-tube anemometer was not in use. If the rather coarse, thick character of the trace is borne in mind, and also the fact that 280 revolutions of the cups are needed to produce a piece of line one-tenth of an inch long, this feature of the cup anemometer's record will be readily appreciated.

INDIAN FAMINE-CAUSING DROUGHTS AND THEIR PREVISION.

THE famine which has now for the last two years been devastating India is a matter of such serious importance in relation to the economy of Indian government and to the rapidly increasing population that no excuse is needed for discussing in these pages the general causes of Indian famines and their relation to the prevision of Indian weather.

The general causes of Indian famine have been summarised by Mr. Eliot, the head of the Indian Meteorological Service, as follows:—

(1.) "Prolonged delay in the commencement of the rains more especially of the summer monsoon."

(2.) "A prolonged break in the middle of the south-west monsoon rains."

(3.) "Scanty rainfall during the greater part, or the whole of the season."

(4.) "Unusually early termination of the south-west monsoon rains."

This last being especially fatal in the case of rice crops on unirrigated land.

In different parts of India these several factors work very differently.

Thus in Northern India, which comes under the incidence of both the south-west monsoon or summer rains and of the comparatively minute but valuable fall in the winter months, famine is usually due either to the failure of two crops in succession, the "Kharif" or summer crop and the "rabi" or winter crop, or to the complete failure of one crop after a succession of poor or bad seasons.

In the Deccan they are usually due to the more or less complete failure of the south-west monsoon rainfall throughout.

In general it may be said that failure of either the summer or winter rains or both together tend to produce famine in proportion to the intensity of the drought, the time of its duration and the area over which it extends. An untimely excess of rainfall seldom produces more than a local scarcity.

One very curious circumstance in regard to the prevalence of famine in India is that the area most subject to famine is not the most arid district but a zone intermediate between this and the moister areas which is technically designated as "dry."

Statistically, India may be divided into three areas (1) the arid area with a rainfall less than 15 inches per annum. Since all crops grown on this area are watered by irrigation it is practically independent of variation in the seasonal rainfall, and it is a non-famine area.

(2.) The dry area, in which the annual rainfall ranges from 15 to 35 inches. This is the real famine area and on the map appears as two great areas, one in Central and Southern India embracing the Deccan, Mysore, South Madras, and the other a belt stretching in the form of a boomerang from the Gujrat peninsula north-eastwards to Lucknow and Allahabad and thence north-westwards to Peshawar.

In time of severe famines such as the present, when the conditions in both areas are coincidently prolonged, the famine area embraces both at once and extends more or less symmetrically over the areas adjoining their borders.

(3.) The moist zone, in which the rainfall ranges from 35 inches to 200 inches and upwards. This area, which includes the rest of India, is practically a non-famine area.

Various attempts have been made to correlate the occurrence of Indian famines with the variations in the energy derived from the sun corresponding to the periodic changes in the spotted area, but

though there are evidences of parallelism, the relation is not a simple or regular one. The condition of the sun is probably a contributory *vera causa* but not a *maxima causa.*

Re-acting conditions initially determined by changes in the position of antarctic ice, slight deflections in the equatorial ocean currents and in the vertical and horizontal position of upper atmospheric air streams of abnormal condition such as those recently shewn to exist by means of the Kite observations at Blue Hill Observatory are likely to be far more potent prime causes of seasonal abnormals than the small and fairly regular changes which appear to follow the appearance and disappearance of sunspots.

In fact the study of famine prevision can only proceed successfully with that of the general terrestrial factors which lie at the base of the normal and abnormal occurrence of the "monsoons."

The comparative regularity with which these periods of similar winds and weather alternate half-yearly, is one of the most salient and remarkable features of the Indian weather system, and the study of their proximate and remote causes, their changes from year to year, and their general local distribution of rainfall, have for several years formed the "*maxima quaestio*" of the Indian forecaster.

For the purpose of prediction, the American or European, and the Indian Meteorologist, regard weather from entirely different points of view.

To the former it appears to be mainly due to the passage of a succession of low and high pressure areas (technically termed cyclones and anticyclones) with their attendant respective characteristics of ephemeral stormy and fair weather.

To the Indian meteorologist, on the other hand, it appears to be chiefly a succession of broad seasonal changes, commencing suddenly in the case of the summer monsoon, and though characterised by minor changes due to the similar passage of ephemeral moving cyclonic and anticyclonic systems, it remains of a fairly constant and dominant type, when once it has fairly set in.

The marked changes from day to day which characterise the proverbially "fickle weather" in England, are less marked in that of India, while the persistent seasonal tone of the latter is comparatively unnoticed even if present in the former.

This apparently radical difference between the weather in India and that of extratropical countries, has led to an equally radical departure in the system of forecasting adopted there.

While in England and Europe, we are still content with 24 hourly predictions, founded chiefly on mere empirical sequences of changes already in existence, and in America the utmost limit at present adopted is 48 hours, India has boldly struck out into officially endorsed predictions, issued in May and November, of the average weather of the ensuing half-year.

The success of the forecasts, which have now been in operation for the last twelve years, has been such, that in spite of its well known

financial difficulties the Indian government has recently extended its field of observation so as to embrace portions of Persia, Kashmir, Arabia, East Africa, Mauritius and communication with West Australia, and with good reason, for as the investigation of the conditions upon which the initiation and persistence of the monsoons depend proceeded, it was found that the local factors such as early hot weather in the plains, or late snowfall on the Himalaya were insufficient to account for the large anomalies presented in different years and that extraneous causes were at work in surrounding areas which dominated and often masked any apparent temporal coincidences such as were too readily accepted in the early period of Indian meteorology as sufficient to account for everything.

(*To be continued.*)

METEOROLOGICAL OBSERVATIONS DURING THE ECLIPSE.

To the Editor of the Meteorological Magazine.

SIR,—Thinking they might be interesting, I send you some meteorological observations I made here on May 28th, 1900, before and during the solar eclipse, which lasted from 2.45 to 5 p.m., G.M.T. (the max. obscuration being 7-10ths at 3.53 p.m.). A light W.N.W. breeze blew, veering to N.W. at 4.30 p.m., and the sky was nearly cloudless.

Hour, G.M.T.	Bar. at 32° and sea level.	Temp. in Stevenson's Screen.		Humidity.	Black Bulb. Max. in vacuo, in sun.
		Dry.	Wet.		
	in.	°	°	%	°
2. 0 p.m.	30·320	59·9	54·5	69	...
3. 0 ,, ...	30·322	60·8	53·7	62	112·8
3.30 ,, ...	30·334	59·2	53·3	66	90·3
3.45 ,, ...	30·337	57·9	52·8	70	76·7
4. 0 ,, ...	30·340	56·8	52·1	72	71·2
4.15 ,, ...	30·338	56·2	52·0	74	73·7
4.30 ,, ...	30·332	57·1	53·3	77	84·2
4.45 ,, ...	30·336	57·6	53·7	76	85·2
5. 0 ,, ...	30·333	58·6	54·5	76	89·2
5.15 ,, ...	30·333	57·8	52·9	71	...
6. 0 ,, ...	30·335	58·1	53·6	73	...

Max. Temp., 2 to 3 p.m.		Fall of Temp. (from Max. to Min.)		Rise of Temp. after Eclipse Min.		Rise of Humidity during Eclipse.	Fall of Humidity after Eclipse.
In shade.	In sun.	In shade.	In sun.	In shade.	In sun.		
°	°	°	°	°	°	%	%
61·8	118·8	5·6	47·6	2·4	18·0	15	6

There was much darkening of the landscape during the eclipse, different from that caused by clouds intervening between the sun and earth.—Yours truly,

EDWIN E. GLYDE.

Statsford, Whitchurch, Tavistock, June 4th, 1900.

ROYAL METEOROLOGICAL SOCIETY.

THE first of the afternoon Meetings for the present Session, was held on Wednesday, May 16th, at the Society's rooms, 70, Victoria Street, Westminster, Dr. C. Theodore Williams, President in the Chair.

The following gentlemen were elected Fellows:—Mr. J. Dunn, Mr. T. Almond Hind, Mr. R. H. Maund, Mr. F. D. Outram, C.E., Rev. H. C. V. Snowden, Mr. P. C. Trebeck, Mr. W. J. Trevaskis.

The Secretary read an interesting paper on "The Wiltshire Whirlwind of October 1st, 1899," which had been prepared by the late Mr. G. J. Symons, F.R.S., just before he was seized with his fatal illness. The readers of the *Met. Mag.* will remember how often Mr. Symons collected data respecting whirlwinds which occurred in this country, and they will therefore understand that he visited the district and personally investigated the track of this whirlwind. Mr. Symons wrote:—

"It has been the author's privilege to visit the sites of many of these disturbances during more than thirty years, and also during that period to receive particulars of the paths of many others, with maps, photographs, and other illustrations. He is not now submitting a paper upon whirlwinds in general, but upon that of October 1st, 1899, and he refers to previous ones merely to say that, as regards force, he has seen more remarkable manifestations at Baldock, Hertfordshire, in 1875, and Walmer in 1878. With regard to direction there is a curious parallelism between the track herein to be described and that of the Cowes whirlwind of September 28th, 1876. The fact of the one occurring within three days of the anniversary of the other, may be a mere coincidence. But as regards direction there are some facts still more curious, but which cannot be considered now. It is hoped that some one will take them up on another occasion. The author now gives merely the dates and the angles with the meridian of all the whirlwinds in the south-east of England which he can find or has himself determined:—

1729.	May 20.	Pevensey Bay to Newingden Level ...	N. 24° E.
1872.	July 25.	Wantage	N. 22° E.
1872.	Nov. 30.	Banbury (a curved track but about) ...	N. 10° E.
1875.	June 12.	Baldock	N. 62° E.
1876.	Sept. 28.	Cowes	N. 30° E.
1877.	Aug. 10.	Guildford	N. 33° E.
1878.	Oct. 24.	Walmer	N. 42° E.

All these tracks are within 26° of N. 36° E., and their mean is N. 32° E. The track of the whirlwind now to be noticed falls well within the above limits, for though slightly bent at first its mean direction may be taken as N. 20° E. Why do whirlwinds in the south-east of England generally go from South-south-west to North-east?"

From the Daily Weather Chart it appears that on the morning of

October 1st, the centre of a depression was off the extremity of Cornwall; and this depression moved across the country in a north-easterly direction. The whirlwind occurred considerably in front of the centre and north-east of it. The weather during the day was wild and squally, with thunderstorms in many places. The length of the damage caused by the whirlwind was nearly 20 miles, but the average breadth was only about 100 yards.

"The first trace of the storm is afforded by Mr. Charles Yates, who states that the trees in a copse near Middle Winterslow were violently agitated and twisted about in a manner which he had not before seen, but that no breakage occurred. This spot is in 1° 39′ 40″ W. and 51° 5′ 25″ N.; it is $1\frac{1}{3}$ miles south by west of the first recorded damage, and about 200 yards west of a prolongation backwards of the path eventually taken: it is rare to obtain details so near the commencement."

Owing to the whirlwind having passed over a large portion of bare down, the damage was only slight compared with what it might have been had it passed over a thickly populated district. As it was, buildings were unroofed, trees were blown down, and other objects were carried a considerable distance before being deposited on the ground. Great havoc was wrought at Old Lodge, the farmyard being completely wrecked and trees torn and twisted in a very remarkable manner.

"Perhaps the most striking evidence of the lifting power developed by the passage of a whirlwind over even a small volume of air, is afforded by the fact that the air below the barn floor, though less than 2 ft. thick and open to expand laterally (only it had not time), sufficed to lift the whole floor and carry it laterally about 20 ft., depositing it at an angle of nearly 45° with its original position.

"A shed near the northern extremity of the yard, built of wood, on a brick foundation, and which was about 11 ft. square and 10 ft. high, was lifted up and dropped down 5 ft. west of its original position. Another wooden shed 12 ft. 6 ins. square and about 9 ft. high was lifted off its brick base, its centre moved about 7 ft. to north-west, and its sides deposited at an azimuth 37° W. with their original position."

Seven miles further on at the farm of Great Shoddesdon the damage was nearly equal to that at Old Lodge.

At a distance of eighteen and a half miles from its origin, the whirlwind "came upon a rick of oats, a considerable portion of which it carried right over the village of Ham and deposited in a field belonging to 'Prosperous Farm,' one and two-thirds of a mile (say 3,000 yards) from where it had been picked up."

In the discussion which followed the reading of this paper:

Mr. Sowerby Wallis said that the paper was the last piece of work done by Mr. Symons before he was stricken down with paralysis, he being engaged on it the day before his illness. It had often struck Mr. Wallis as a curious fact that nearly all the known instances of

destructive British whirlwinds occurred in the south-east of England, and travelled in a somewhat similar direction. Another feature common in whirlwinds was the manner in which the severest damage was concentrated at isolated spots along the track, as though at times the whirlwind come in contact with the ground and then rose into the air.

Mr. F. J. Brodie remarked that this paper showed that the collection of rainfall statistics was only a small part of Mr. Symons's service to Meteorology. No information respecting this particular whirlwind had reached the Meteorological Office. The Weather Chart threw no light on the occurence, as it seldom does, the stations being too far apart.

Mr. R. H. Curtis referred to a whirlwind which he observed many years ago in Piccadilly, and also to another which occurred at the Stamford Bridge Grounds, Chelsea. He thought these whirlwinds were probably due to the differences of temperature at various levels in the atmosphere.

Capt. A. Carpenter gave an account of two small whirlwinds which he had recently observed from his house at Croydon. He thought that the reason why some of the farm buildings at Old Lodge were twisted and others not, was the fact that those not directly in the path of the whirlwind did not experience the full force of the wind.

Mr. H. N. Dickson suggested that an examination of the conditions and type of barometric distribution in which this kind of phenomena occurred would be very useful.

Dr. H. R. Mill thought that the reason why the south-east of England suffered most from these visitations was that the configuration of the ground was favourable for their formation, and the general trend of the valleys and the usual course of storms along these tracks no doubt determined the direction of the whirlwinds.

Mr. R. Bentley remarked that he had referred to the dates and localities of over fifty whirlwinds in the United Kingdom, and found that August was the month in which the largest number occurred; but they were also very numerous in the months of June, July and October, and comparatively few in September. They happened most frequently in the Midland counties, and very frequently also on the east side of England between Yorkshire and Kent, and more rarely in other parts.

Mr. W. Marriott referred to the thunderstorm observations organized by the Society in 1888 and 1889, from the discussion of which it appeared that the thunderstorm formations were really small cyclonic disturbances. He had tried to improve upon the Daily Weather Charts by preparing maps with the isobars drawn for each two-hundredths of an inch. These, to a large extent, indicated the localities where thunderstorms were in progress; but the direction of the wind was more important, for where there was any

deflection of the arrows, it was almost invariably connected with a thunderstorm.

Mr. W. H. Dines remarked that in America tornadoes occurred in the south-east quadrant of low pressure systems, and that most damage was done by south-east winds.

Mr. H. N. Dickson gave a summary of an elaborate paper by Dr. Nils Ekholm, of Stockholm. "On the Variations of the Climate of the Geological and Historic Past and their Causes." The author, who had presented this paper to the Society on the occasion of its Jubilee, attempts to apply the results of physical, astronomical and meteorological research in order to explain the secular changes of climate revealed by geology and history. The subject is treated under the following heads :—

1. The general causes of changes of temperature.—2. Geological chronology. The probable age of life on the earth.—3. The radiation of the sun nearly constant during geological ages. The temperature of the earth's surface explained by the equilibrium between insolation and radiation from the earth into space.—4. Variations in the quantity of carbonic acid of the atmosphere the principal cause of the great climatic variations during geological ages.—5. The secular cooling of the earth is the principal cause of the variations of the quantity of carbonic acid in the atmosphere. Modifying influences.—6. Variations of the obliquity of the ecliptic and their influence on the climate.—7. Climatic variations during historical times, particularly in north-western Europe.—8. Conclusions. Probable variations of climate in the future.

THE RELATIVE HUMIDITY OF OUR HOUSES IN WINTER.*

THE present season seems scarcely appopriate to the discussion of the above subject, unless it be to stimulate some of our readers to take action in the matter before next winter. It is a subject which we have often considered of much import and have wished for time to study experimentally, but have not been able to find it. We have, therefore, heartily welcomed the receipt of a paper with the above title, by Prof. R. De C. Ward of Harvard University and hope, he will not think that we have exceeded the justifiable limit of quotation :—

"In discussing with my classes in climatology the various ways in which climatic conditions affect man, I have been accustomed to point out that the climate which we have been able to produce inside of our modern houses is an extremely artificial one . . . . . In summer we are able to keep the air in our houses cooler than that

* The Relative Humidity of our houses in Winter, by Robert De C. Ward. *Reprinted from the Boston Medical and Surgical Journal, of March 1, 1900.* 8vo. Boston, 1900.

outside by closing windows and blinds, and by means of artificial ventilation. In winter our houses are heated, and we live in an atmosphere which is many degrees warmer, and very much drier, than that out of doors. This dryness of the air indoors in winter I have been in the habit of comparing with that of deserts, although I have never used any numerical data in making this comparison. In view of the importance of this matter from a physiological point of view . . . . . I have recently made a short series of simple observations along these lines."

Observations were made inside the professor's study on the average four times a day from November 3rd to 23rd, with a sling psychrometer and were compared with the records of Richard instruments outside, with the following result :—

	INSIDE.		OUTSIDE.	
No. of Observations.	Mean temp.	Mean relative humidity.	Mean temp.	Mean relative humidity.
78	69°	30 per cent.	36°	71 per cent.

The max. relative humidity, 45 per cent., was recorded on November 6th, at 8 a.m., when there was little heat from the furnace, and the min. was 21 per cent. on Novemver 23rd at 10 p.m.

"In one case (November 4th) a change of wind from south-east to north-west, accompanied by clearing weather, was closely followed by a decrease in relative humidity of 34 per cent. outdoors and of 6 per cent. indoors. In another case (November 11th) a change of wind to the east, with rain, brought a rise in relative humidity of 15 per cent. outside and of 6 per cent. indoors."

"Now, the interesting question is: how did the relative humidity indoors compare with that of other places outdoors? It has been seen that the mean relative humidity in Cambridge during the twenty-one days of observation was 71 per cent.," [while indoors for the same period it was 30 per cent.] "The mean relative humidity in Boston for the year 1899 was 69 per cent., and for the month of November, 1899, 68·8 per cent." . . . . "In the dry interior of the great Eurasian Continent we find the following relative humidities: South-western Siberia and Western Turkestan have a mean of 45-50 per cent. in July. Yarkand, in Eastern Turkestan, has a July mean of 47 per cent. In the arid region in the neighbourhood of the Sea of Aral, Nukuss (lat 42°·5 N., long. 59°·6 E.) has a June mean of 46 per cent., and a 2 p.m. June mean of 19 per cent. Petro-Alexandrowsk, a degree and a half east of Nukuss, in the desert (lat. 41°·5 N., long. 61°·1 E.), has a mean of 34 per cent. in June. Kasalinsk (lat. 45°·8 N., long. 62°·1 E.) has a mean of 45 per cent. in July. The air is still drier in the deserts nearer the equator. Ghadames, in Tripoli, has 27 per cent. in July, and 33 per cent. in August, and the Kufra Oasis has 27 per cent. in August, with a 3 p.m. August mean of 17 per cent., and 33 per cent. in September. In the Punjab and North-western India, Lahore has 31 per cent. and Agra has 36 per cent. in May."

"These examples show clearly enough that the atmosphere of the room in which the observations above referred to were made, was, and is, drier than that of many desert regions. That so dry an atmosphere is not healthy, especially in our winter climate, there is no need of an argument to show." . . . . . .

Similar observations made by Dr. H. J. Barnes, of Boston, in his office and in various hospitals, are very accordant, giving a mean relative humidity indoors of 31 per cent., while the mean relative humidity outdoors was 71 per cent.

In England domestic heating by hot air is not general, but probably our open coal fires and, even more, the gas fires which are so rapidly increasing in number, reduce the relative humidity of the air in our rooms to almost as low a point; especially as the evaporating pan referred to as a usual accompaniment of the furnace in the United States is almost unknown in England.

A SUN PILLAR.

To the Editor of the Meteorological Magazine.

SIR.—On Monday, May 28th, the day of the eclipse, which was beautifully seen in Somersetshire, I was cycling homewards with my back to the sunset. At about 8.20, when between Ditcheat and Castle Cary, at a turn in the road I caught sight of what at the first glance seemed to be a bit of a solar halo.

But the sun was already set, and this luminous stripe was not curved, but appeared to stand like a vertical pillar or column of rosy-orange light above the already sunken sun. Proceeding towards Castle Cary, I got a better view of it, and its brilliancy seemed to increase as the light elsewhere became dimmer. It was still shining brightly at 8.35, when I entered Cary, but had disappeared when a few minutes later I could get a clear view again to the N.W.

I never saw anything in the least like this before, so perhaps others who did not see it may be interested to hear of such a phenomenon.

H. A. BOYS.

North Cadbury Rectory, S.E. Somerset, May 31st, 1900.

[A sun pillar, seen near Sidmouth, April 4th, 1871, was figured in the *Met. Mag.*, Vol. VI., No. LXVI. The phenomenon is also referred to in the article on Halos by Dr. Cherrill in *Met. Mag.*, Vol. XXVI., No. CCCIV.—ED.]

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, DECEMBER, 1899.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Dew Point.	Average. Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	Total Rain. Depth.	Total Rain. Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
London, Camden Square	55·3	6	21·8	14	41·6	32·4	33·7	80	68·3	15·8	1·05	17	7·7
Malta	67·7	21	46·7	5	63·2	52·5	50·2	79	123·8	39·8	3·99	20	5·4
Cape of Good Hope	98·1	15	48·9	8	77·4	59·5	56·5	66	...	...	1·30	3	3·3
Mauritius	87·0	28	68·0	1, 5	83·9	72·3	67·0	71	156·2	58·6	1·31	12	5·4
Calcutta	84·1	7	50·0	16	78·5	55·4	54·6	66	139·5	38·0	·00	0	1·3
Bombay	90·4	20	68·2	10	86·2	70·9	64·9	65	135·7	55·1	·00	0	0·9
Ceylon, Colombo	90·2	13*a*	69·2	5	87·6	73·0	69·5	77	156·0	67·0	4·48	8	4·5
Melbourne	104·2	31	45·5	12	79·6	55·0	48·5	57	156·9	36·0	1·23	6	4·4
Adelaide	109·6	31	48·9	12	84·7	59·2	48·9	44	175·7	40·3	·59	4	2·8
Sydney	102·1	1	57·3	17	79·2	64·5	58·5	62	155·1	46·4	·70	7	5·1
Wellington	73·0	31	44·0	18	65·5	52·6	48·9	69	130·0	35·6	4·48	12	4·3
Auckland	78·0	29	53·5	18	70·1	57·9	55·2	74	141·0	45·0	·34	5	4·1
Trinidad	...	...	...	...	...	...	...	...	...	...	...	...	...
Grenada	87·0	12	71·6	28	84·5	74·2	71·4	72	154·2	...	4·82	16	1·5
Toronto	52·7	1	— 5·6	30	35·2	23·0	25·8	78	60·7	—9·5	2·53	20	6·8
New Brunswick, Fredericton	52·8	12	—14·8	31	31·0	13·2	15·7	76	...	...	5·10	15	5·8
Manitoba, Winnipeg	41·0	22	—20·0	25	19·0	1·1	...	80	...	...	·10	2	4·5
British Columbia, Esquimalt	...	...	...	...	...	...		...	...	...	...	...	...

a—and 17.

REMARKS.

MALTA.—Adopted mean temp. 57°·2, or 1°·0 above average. Mean hourly velocity of wind 10·8 miles, or 0·3 below average. Mean temp. of sea 64°·5. TSS on 6 days; L on 3 days; H on 4 days. Dew point ranged from 59°·7 on 31st to 41°·9 on 17th. J. F. DOBSON.

Mauritius.—Mean temp. of air 0°·4 above, of dew point 1°·0 and rainfall 3·55 in. below, their respective averages. Mean hourly velocity of wind 11·2 miles, or 0·3 above average; extremes, 30·1 on 13th and 1·7 on 20th; prevailing direction, S.E. by E. to E. by N. T. F. CLAXTON.

CEYLON, COLOMBO.—Mean temp. of air 78°·8, or 0°·3 below, of dew point 1°·4 below, and rainfall 1·97 in. below, their respective averages. Mean hourly velocity of wind 11·6 miles; prevailing direction N. TS on 1st. H. O. BARNARD.

Adelaide.—Mean temp. of air 0°·7 above, and R ·25 in. below, their respective averages for 42 years. Generally a dry month, especially inland. More than average of extreme heat, 7 days being over 100° and 3 over 109°. C. TODD, F.R.S.

Sydney.—Temp. 2°·0 above, humidity 7°·1 below, and rainfall 3·86 in. below, their respective averages. H. C. RUSSELL, F.R.S.

Wellington.—The early part of the month was showery, and there were heavy showers in the middle; the remainder was generally fine, though not warm for the time of year. T on 2 days. Slight fog on 2 days. Slight earthquake on 4th. Mean temp. 1°·8 below, and rainfall ·67 in. above, the average. R. B. GORE.

Auckland.—An unusually dry December, the rainfall being barely one-eighth of the average of 32 years. Barometric pressure and mean temp. close to the average. T. F. CHEESEMAN.

SUPPLEMENTARY TABLE OF RAINFALL, MAY, 1900.

Div	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
I.	Uxbridge, Harefield Pk..	1·03	XI.	Builth, Abergwesyn Vic.	5·57
II.	Dorking, Abinger Hall .	1·06	,,	Rhayader, Nantgwillt ...	3·92
,,	Birchington, Thor	·92	,,	Lake Vyrnwy	2·39
,,	Hailsham	·95	,,	Corwen, Rhug	1·82
,,	Ryde, Thornbrough	1·19	,,	Criccieth, Talarvor	2·35
,,	Emsworth, Redlands ...	1·08	,,	I. of Anglesey, Lligwy..	2·19
,,	Alton, Ashdell	2·09	,,	I. of Man, Douglas	2·93
III.	Oxford, Magdalen Coll..	1·15	XII.	Stoneykirk, Ardwell Ho.	3·25
,,	Banbury, Bloxham	1·64	,,	New Galloway, Glenlee	4·98
,,	Northampton, Sedgebrook	1·05	,,	Moniaive, Maxwelton Ho.	4·70
,,	Alconbury	1·21	,,	Lilliesleaf, Riddell	1·80
,,	Wisbech, Bank House...	1·45	XIII.	N. Esk Res. [Penicuick]	1·50
IV.	Southend	·84	XIV.	Glasgow, Queen's Park..	2·19
,,	Colchester, Lexden	·85	XV.	Inverary, Newtown	5·66
,,	Saffron Waldon, Newport	1·30	,,	Ballachulish, Ardsheal...	6·68
,,	Rendlesham Hall	1·19	,,	Islay	3·59
,,	Scole Rectory	...	XVI.	Dollar.....	2·76
,,	Swaffham	1·66	,,	Balquhidder, Stronvar...	8·02
V.	Salisbury, Alderbury ...	1·80	,,	Coupar Angus Station...	2·97
,,	Bishop's Cannings	1·60	,,	Blair Atholl	...
,,	Blandford, Whatcombe .	1·67	XVII.	Keith H.R.S.....	1·20
,,	Ashburton, Holne Vic...	2·72	,,	Forres H.R.S.	1·12
,,	Okehampton, Oaklands.	3·04	XVIII.	Fearn, Lower Pitkerrie..	1·22
,,	Hartland Abbey	1·75	,,	S. Uist, Askernish	2·58
,,	Lynton, Glenthorne ...	2·26	,,	Invergarry.....	3·20
,,	Probus, Lamellyn	1·83	,,	Aviemore, Alvie Manse.	...
,,	Wellington, The Avenue	1·94	,,	Loch Ness, Drumnadrochit	1·10
,,	North Cadbury Rectory	2·83	XIX.	Invershin	1·35
VI.	Clifton, Pembroke Road	2·53	,,	Durness	2·43
,,	Ross, The Graig	2·77	,,	Watten H.R.S.....	1·82
,,	Wem, Clive Vicarage ...	1·79	XX.	Dunmanway, Coolkelure	5·33
,,	Wolverhampton, Tettenhall	1·95	,,	Cork, Wellesley Terrace	2·42
,,	Cheadle, The Heath Ho.	1·91	,,	Killarney, Woodlawn ..	3·75
,,	Coventry, Priory Row ..	1·73	,,	Caher, Duneske	2·84
VII.	Market Overton	1·92	,,	Ballingarry, Hazelfort...	...
,,	Grantham, Stainby	1·45	,,	Limerick, Kilcornan ...	...
,,	Horncastle, Bucknall ...	·96	,,	Miltown Malbay	2·92
,,	Worksop, Hodsck Priory	1·72	XXI.	Gorey, Courtown House	2·84
VIII.	Neston, Hinderton	1·49	,,	Moynalty, Westland ...	2·24
,,	Southport, Hesketh Park	1·83	,,	Athlone, Twyford	2·53
,,	Chatburn, Middlewood.	1·80	,,	Mullingar, Belvedere ...	2·12
,,	Duddon Val., Seathwaite Vic.	4·30	XXII.	Woodlawn	3·09
IX.	Melmerby, Baldersby ...	1·33	,,	Crossmolina, Enniscoe ..	5·36
,,	Scalby, Silverdale	1·18	,,	Collooney, Markree Obs.	3·75
,,	Ingleby Greenhow Vic..	1·36	XXIII.	Enniskillen, Model Sch.	...
,,	Middleton, Mickleton ...	1·25	,,	Warrenpoint.....	2·48
X.	Haltwhistle, Unthank H.	2·26	,,	Seaforde.....	3·30
,,	Bamburgh	·94	,,	Belfast, Springfield	...
,,	Keswick, The Bank.....	3·62	,,	Bushmills, Dundarave..	2·33
XI.	Llanfrechfa Grange	2·33	,,	Stewartstown	3·04
,,	Llandovery	3·02	,,	Killybegs	4·17
,,	Castle Malgwyn	3·47	,,	Horn Head	3·48
,,	Brecknock, The Barracks	...			

MAY, 1900.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1880-9.	Greatest Fall in 24 hours. Dpth	Date	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Date	Min. Deg.	Date.	No. of Nights below 32°. In shade.	On grass.
			inches.	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	·93	— ·97	·23	22	12	73·7	27	35·6	11	0	3
II.		Tenterden	·98	— ·58	·33	6	9	74·5	6	36·0	16	0	4
,,		Hartley Wintney	1·46	...	·44	21	15	70·0	27	30·0	16	1	5
III.		Hitchin	...	...	...	...	...	...	...	...	...	...	...
,,		Winslow (Addington)	1·45	— ·65	·38	9	11	70·0	27	29·0	11	3	3
IV.		Bury St. Edmunds (Westley)	1·34	— ·41	·64	8	12	67·0	5, 6	34·0	14	0	...
,,		Norwich (Brundall)	1·87	...	·71	8	15	71·0	6	33·0	11	0	8
V.		Winterbourne Steepleton ...	1·98	...	·42	22	8	68·0	29	31·9	12	1	5
,,		Torquay (Cary Green)	1·70	...	·42	2	9	68·4	29	40·4	14	0	0
,,		Polapit Tamar [Launceston]..	1·92	+ ·09	·56	2	11	67·1	29	31·0	26	2	4
VI.		Stroud (Upfield)	2·20	+ ·16	·43	6	13	68·0	28	38·0	15	0	...
,,		ChurchStretton(Woolstaston)	2·74	— ·13	·61	6	12	69·0	8	34·0	14	0	4
,,		Worcester (Diglis Lock)	2·44	+ ·16	·53	9	18	...	...	...	...	...	...
VII.		Boston	1·23	— ·49	·67	8	9	72·0	5	32·0	11*b*	2	...
,,		Hesley Hall [Tickhill].....	1·12	— ·92	·68	8	10	70·0	17	30·0	11	2	...
,,		Breadsall Priory	1·74	...	·79	8	13	...	...	...	...	...	...
VIII.		Manchester(PlymouthGrove)	1·69	— ·66	·48	8	14	69·0	20	32·0	9	1	...
IX.		Wetherby (Ribston Hall) ...	1·12	— ·83	·50	8	7	...	...	...	...	...	...
,,		Skipton (Arncliffe)	2·70	— 1·02	·67	21	15	...	...	...	...	...	...
,,		Hull (Pearson Park).	1·37	— ·51	·76	8	12	69·0	27	31·0	17	4	8
X.		Newcastle (Town Moor)	1·30	— ·45	·35	8	9	...	...	...	...	...	...
,,		Borrowdale (Seathwaite).....	7·70	— ·91	3·88	21	13	...	...	...	...	...	...
XI.	WALES.	Cardiff (Ely).....	1·87	— ·98	·40	21	14	...	...	...	...	...	...
,,		Haverfordwest	2·87	+ ·51	·91	2	12	64·9	30	33·8	20	0	8
,,		Aberystwith (Gogerddan) ...	2·41	...	·58	21	9	66·0	16*e*	...	...	...	...
,,		Llandudno.....	1·58	— ·35	·45	6	11	64·0	28	40·0	13	0	..
XII.	SCOTLAND.	Cargen [Dumfries]	...	...	...	...	...	...	...	...	...	...	...
XIII.		Edinburgh (Blacket Place)...	1·35	...	·42	6	13	68·7	15	37·2	13	0	0
XIV.		Colmonell	4·01	...	·79	2	14	71·0	30	28·0	13	...	...
XV.		Tighnabruaich	4·81	...	·92	21	13	67·0	30	33·0	12	0	...
,,		Mull (Quinish).....	4·41	+ 1·46	·64	3	17	...	...	...	...	...	...
XVI.		Loch Leven Sluices	2·40	— ·16	·70	22	7	...	...	...	...	...	...
,,		Dundee (Eastern Necropolis)	1·70	+ ·04	·35	6, 21	13	71·1	15	33·1	13	0	...
XVII.		Braemar	3·64	+ 1·23	·92	3	20	64·6	16	32·0	12*c*	2	12
,,		Aberdeen (Cranford)	1·19	...	·24	3	19	64·0	28	34·0	10*d*	0	...
,,		Cawdor (Budgate)	1·94	+ ·19	·56	24	14	...	...	...	...	...	...
XVIII		Strathconan [Beauly]	1·85	— 1·24	·55	7	6	..	...	...	...	...	...
,,		Glencarron Lodge.....	3·25	...	·55	4	18	64·4	27	32·0	13	1	...
XIX.		Dunrobin	...	...	...	...	...	....	...	...	...	...	...
,,		S. Ronaldshay (Roeberry) ...	1·70	— ·02	·29	7	21	58·0	24	32·0	18	1	...
XX.	IRELAND.	Darrynane Abbey.....	2·23	...	·40	2	15	...	...	...	...	...	...
,,		Waterford (Brook Lodge) ...	3·41	+ 1·18	·70	21	14	65·5	29*a*	35·0	1	0	...
,,		Broadford (Hurdlestown) ...	2·37	...	·37	21	17	...	...	"...	...	...	...
XXI.		Carlow (Browne's Hill)	2·47	+ ·13	·51	21	15	...	...	...	...	...	...
,,		Dublin (FitzWilliam Square)	1·92	— ·01	·40	23	13	66·7	28	39·4	19	0	0
XXII.		Ballinasloe	4·05	+ 1·36	·64	12	17	67·0	30	37·0	15	0	...
,,		Clifden (Kylemore)	8·74	...	1·78	2	14	...	...	...	...	...	...
XXIII		Waringstown	2·71	+ ·27	·56	4, 23	14	72·0	30	38·0	25	0	...
,,		Londonderry (Creggan Res.).	2·73	+ ·21	·45	22	17	...	...	"...	...	...	...
,,		Omagh (Edenfel)	2·88	+ ·41	·41	2	18	68·0	30	34·0	18	0	1

+ Shows that the fall was above the average ; — that it was below it.

a—and 31. *b*—and 20. *c*—and 19. *d*—and 11. *e*—and 29.

METEOROLOGICAL NOTES ON MAY, 1900.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; TS for Thunderstorm; R for Rain; H for Hail; S for Snow.

ENGLAND.

TENTERDEN.—Another dry month, and generally cold. High wind on 14th and 15th and very windy on 3rd, 13th, 16th, 22nd and 23rd also. TS on 6th. Duration of sunshine 180 hours 30 mins.

HARTLEY WINTNEY.—Cold showers from S.W. prevailed until the 11th, followed by many sunless days with harsh, dry and cold E. and N.E. winds, the temp. on grass on 16th falling to 23°·0. Rainfall ·25 in. below the average. Ozone on 18 days with a mean of 4·9. Swifts seen on 5th. Hawthorn in flower on 18th.

WINSLOW, ADDINGTON.—A cold month, the max. temp. reaching 70° on one day only. The nights were always cold though seldom frosty. On 24th there was a sharp peal of T at 6.30 p.m.

BURY ST. EDMUNDS, WESTLEY.—As regards temp. the weather was of the usual type. There were eighteen days with northerly winds. Distant T on 24th. Vegetation backward.

NORWICH, BRUNDALL.—The fifth cold May in succession. T and L at 6 a.m. on 9th.

WINTERBOURNE STEEPLETON.—A cold and ungenial month, but May usually is so. Very good prospects for the fruit crops.

TORQUAY, CARY GREEN.—R ·32 in. below the average, that of the first five months of the year being 3·29 in. above the average. Mean temp. for May 51°·9 or 1°·3 below the average. Duration of sunshine 248 hours 5 mins. being 24 hours 10 mins. above the average. Two sunless days. Mean ozone 5·8 the greatest being 8·5 on 3rd and 4th with S and W. winds, and the least 3·5 on 10th and 11th with N. and E. winds.

POLAPIT TAMAR [LAUNCESTON].—The first week was rather wet and stormy and the month generally unseasonably cold. T on 8th.

WOOLSTASTON.—A backward and ungenial month. Violent H on 23rd. Mean temp. 52°·0. Swifts arrived on 6th.

WALES.

HAVERFORDWEST.—An unusually cold and stormy month with not much bright sunshine. On 2nd a gale commenced in the afternoon and continued with varying force from moderate to strong, until the 4th, when it abated during the night. Foliage of trees was much damaged and fruit trees in exposed positions suffered considerably, but fruit crops generally promise well. The oak was much in advance of the ash. Hay crops and vegetation generally very backward. T on 8th.

ABERYSTWITH, GOGERDDAN.—Cold and dull for May, with little sunshine. Crops very late but promising.

SCOTLAND.

EDINBURGH, BLACKET PLACE.—Mean temp. 0°·7 above, duration of sunshine 17 hours below, and rainfall 35 per cent. below, their respective averages. Squally on 4th, 5th and 9th. H on 13th.

CLACHANTON, COLMONELL.—R 1·55 in. above, and mean temp. (51°·7) 0°·9 above, the average of 24 years. Gales blew on each of the first five days.

CRAIGANDARAICH, TIGHNABRUAICH.—A good average month as regards rainfall, temp. and sunshine.

ABERDEEN, CRANFORD.—Cold, with high winds and little sunshine. Strong breezes from N. and N.W. between the 8th and 19th.

S. RONALDSHAY, ROEBERRY.—A very fair month on the whole. Mean temp. 48°·5, or 1°·2 above the average of 10 years.

IRELAND.

DARRYNANE ABBEY.—The first half of the month was mild and showery, the second half fine and warm, and the last few days were very hot.

WATERFORD, BROOK LODGE.—A very backward spring. Oak trees much more forward than ash. Heavy gale from S.W. on 4th, and S.S.W. gale with H showers on 22nd. H on 3rd. T at night on 12th. Corncrake heard on 6th, and many swallows seen about the middle of the month.

BROADFORD, HURDLESTOWN.—R ·13 in. less than, and rainy days one more than, the average for 15 years. T on 3rd and 9th.

DUBLIN, FITZWILLIAM SQUARE.—A favourable, spring-like month, with the usual preponderance of polar (N.E.) winds, dry sunny days, and clear cold nights. In the week ending on 26th there were heavy rains and H showers, with T and L on 23rd. Mean temp. 52°·5, or 0°·5 above the average. Solar halos were seen on four days. High winds were noted on 11 days, but attained the force of a gale only on the 3rd. Slight fog on 12th and 30th. H on 22nd, 23rd, and 24.

BALLINASLOE.—S.W. gale on 3rd. L and T in afternoon on 8th. S.E. gale on 21st. Distant T on 31st.

OMAGH, EDENFEL.—The beginning of the month was rainy and unsettled, with temp. somewhat below the average but not repressive of general vegetation, but from the 12th, the usual dry cold period (which seems to be a fixed meteorological fact with the 3rd week in May) followed, accompanied by polar and easterly winds. Unlike England and Scotland, however, the min. temp. on grass only once (18th) reached freezing point, and no damage to fruit followed. From 20th to 27th it was again rainy and unsettled, giving way for the last few days to a brilliant spell of summer. All vegetation (especially flowering trees and shrubs) remarkably luxuriant.